NATURAL RESOURCES CANADA - INVENTIVE BY NATURE

"Hope it don't thunder tonight!"

Wildland fire and forest drought in Canada in 2017

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Pinus contorta var. latifolia Engelm. **Dougl. ex Loud**
Natural Resources Canada – Canadian Forest Service

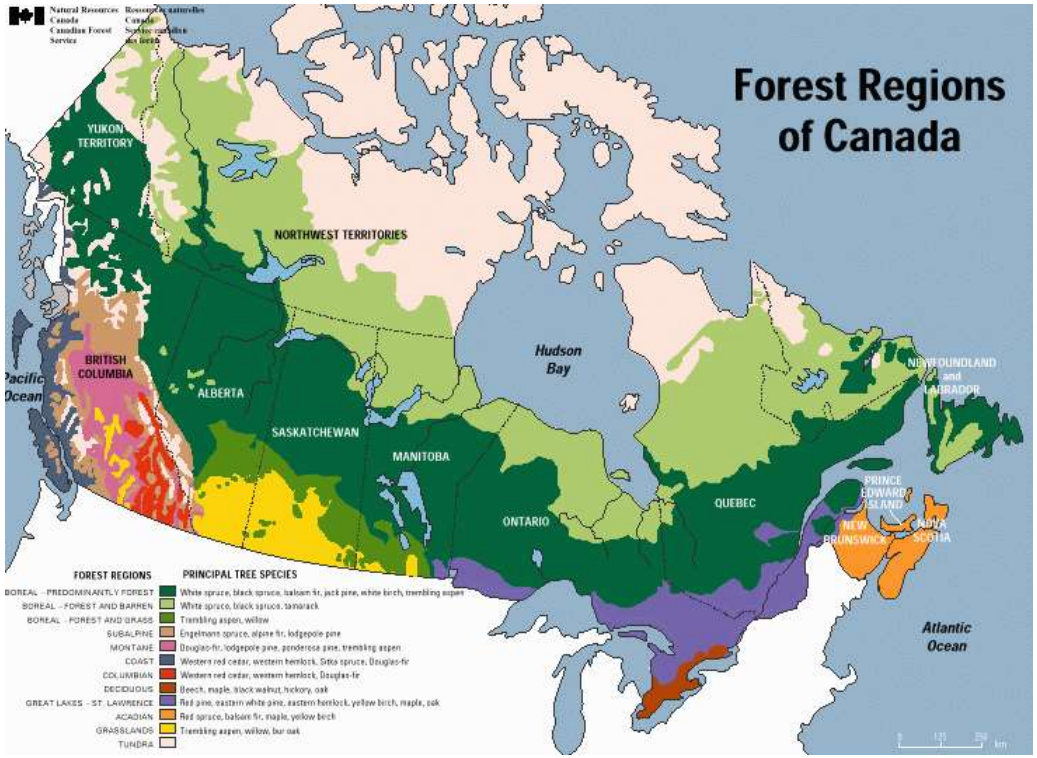
Summary

- Background: fire activity in Canada
- A bit about forest drought
- The 2017 fire season
- Summary/conclusions

Fire Occurrence in Canada

Canada's forests

- Total area of more than 4 million km²
- 45% of Canada's land area



Rowe (1972) Forest Regions of Canada

Title context

- **Title quote is from a former co-worker**
- **Trees may interpret the quote differently, although fire brings new life**

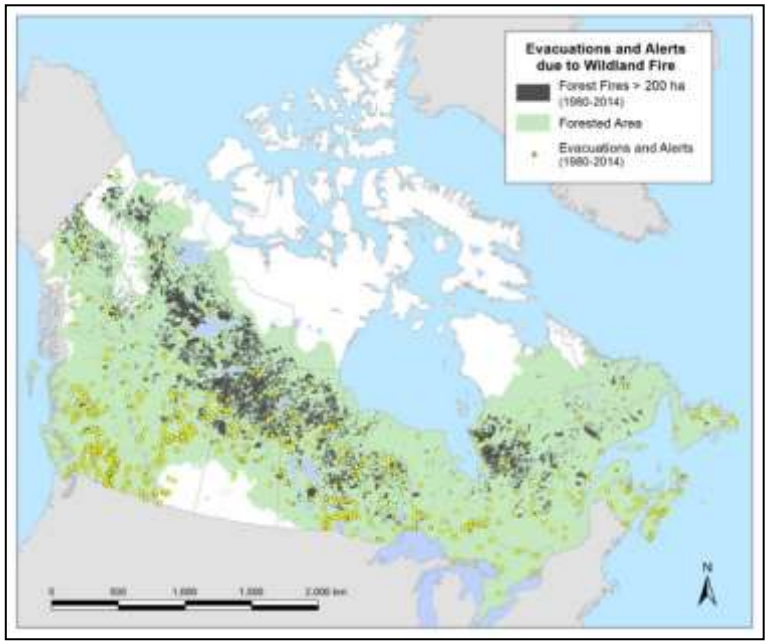
BC Forests, Lands, Natural Resource Operations & Rural Development
https://www.for.gov.bc.ca/hfp/silviculture/compendium/LodgepolePine.htm

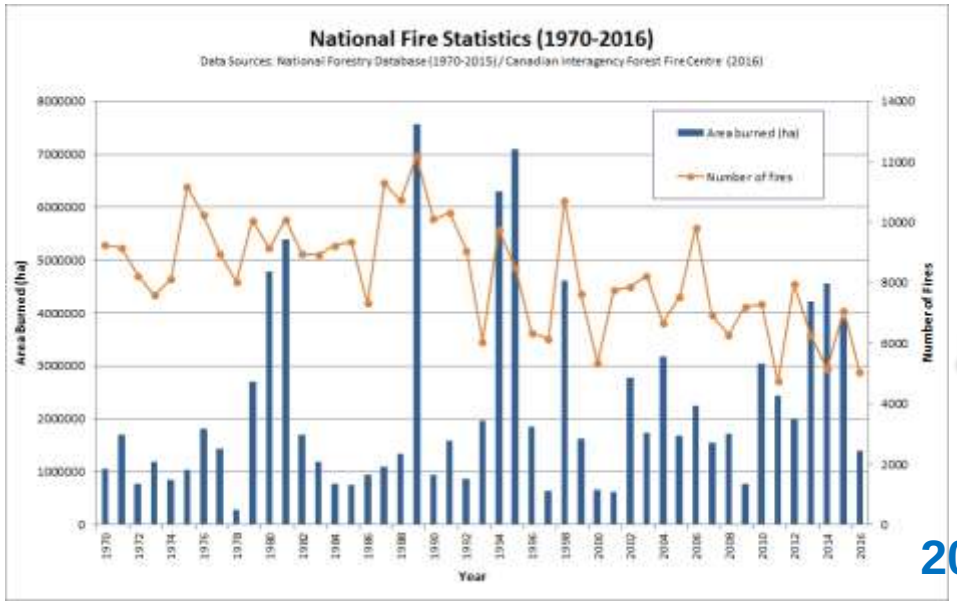
Lodgepole Pine
Pinus contorta var. latifolia Engelm. Dougl. ex Loud
Natural Resources Canada – Canadian Forest Service

Fire occurrence in Canada

Lightning fires burn large areas

- Most occur in the boreal forest
- 3% of fires burn 97% of the area



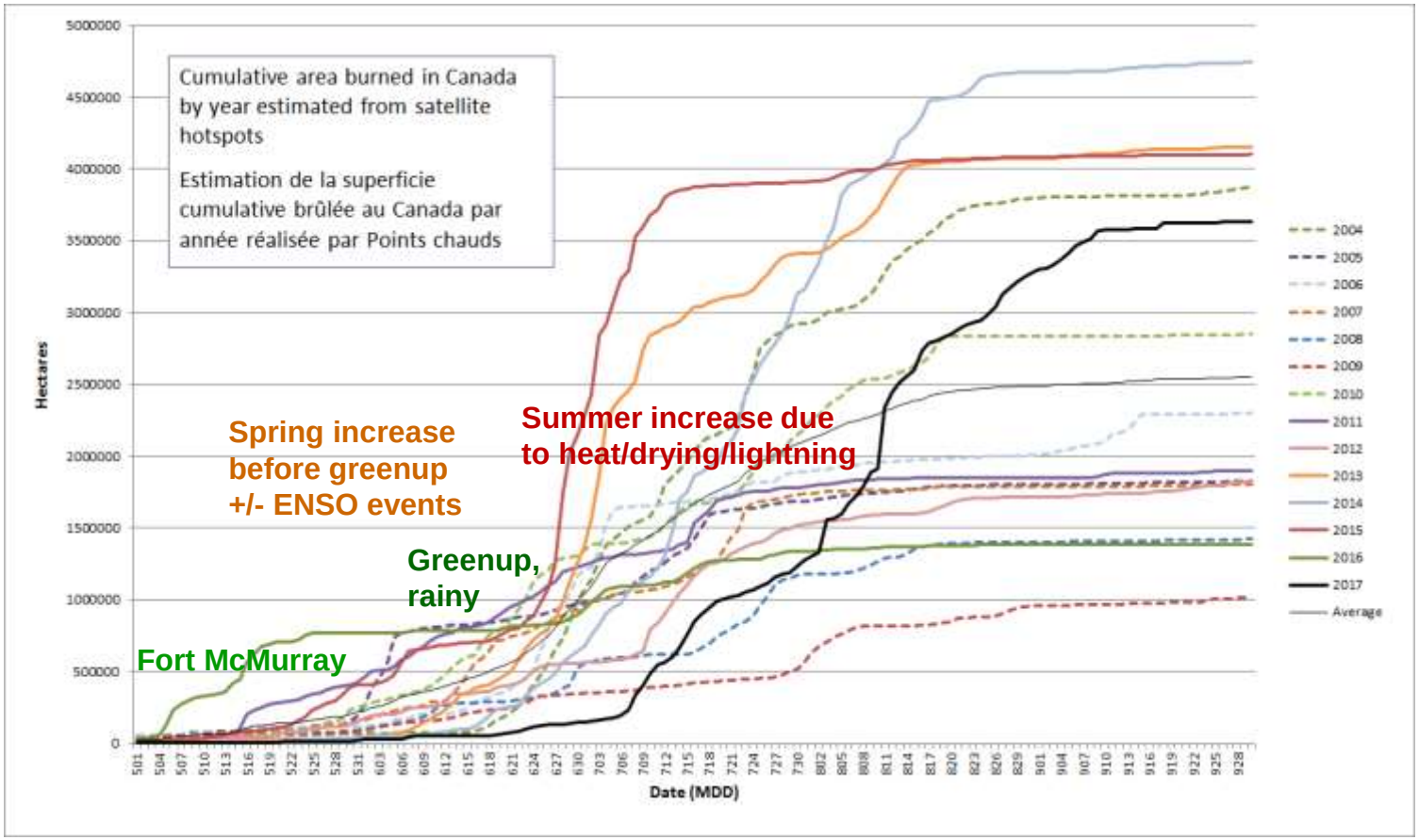


Each year has about:

- 7,500 forest fires (NFDB 1990-2016)
- 2.5 million ha burned (NFDB 1990-2016)

Fire number and area burned varies greatly between years

Cumulative area burned 2004-17



2004, 2013-2015, and 2017 had the most area burned in the last 20 years

Drought and CFFWIS Moisture Codes

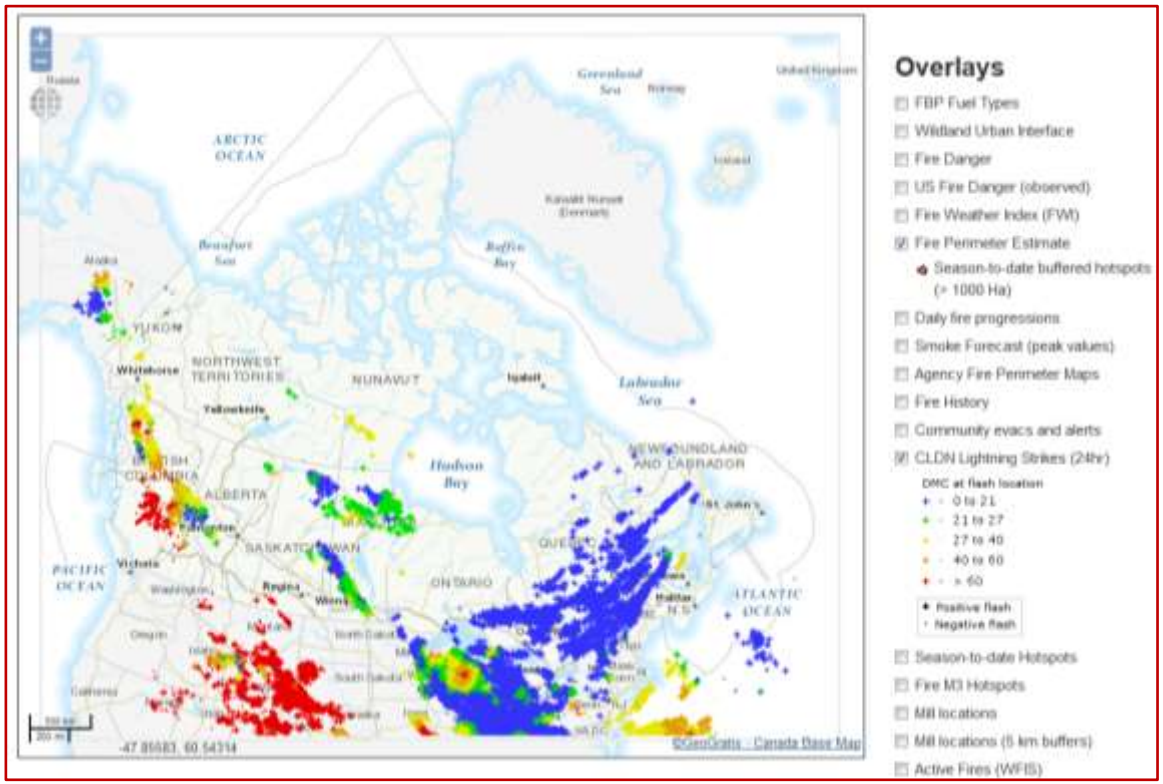
Lightning and fire

- Lightning starts fires in the Fibric (F) layer
  - 2-7cm (1”-3”) depth
  - Moisture represented by the Duff Moisture Code (DMC) in the CFFWIS

July 8, 2017

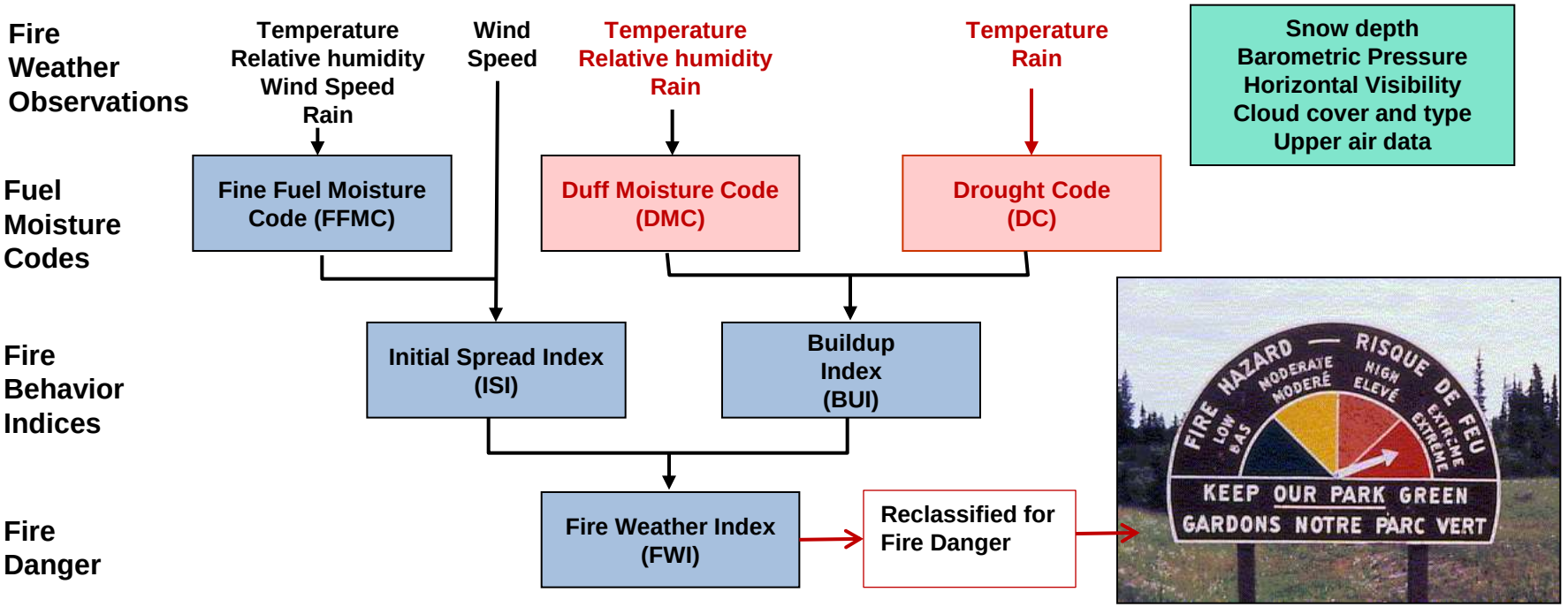
DMC to ~300

DC to ~800



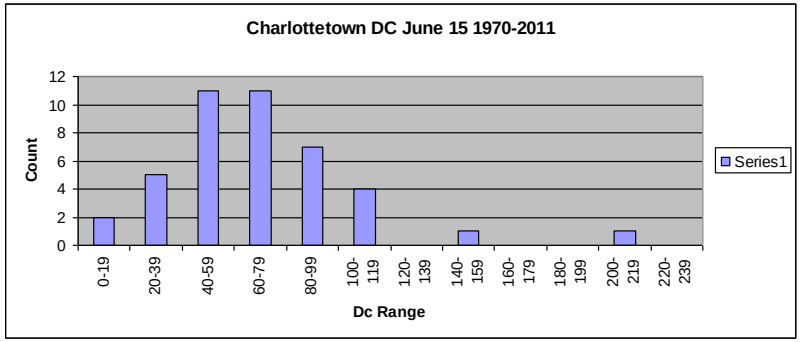
The CFFWIS

- CFFWIS: Canadian Forest Fire Weather Index System
- Fire research began in 1925
- Modern modular system developed by 1970 and last revised in 1984
- Drought Code (DC) component developed in 1966 (Turner)
- Local noon weather correlated to late afternoon burning conditions



DC to NADM Classes

- Mean DC selected in same *n*-day period (7 days) 1900-current
- Rank lowest to highest, find percentile of current period's DC
  - Skewness, multimodality?
- Assign to NADM classes
  - Subtract a class for each 25-year period portion without observations
  - Maximum of 3 classes subtracted



Percentile		Intensity:
70	→	D0 Abnormally Dry
77	→	D1 Drought - Moderate
84	→	D2 Drought - Severe
91	→	D3 Drought - Extreme
98	→	D4 Drought - Exceptional

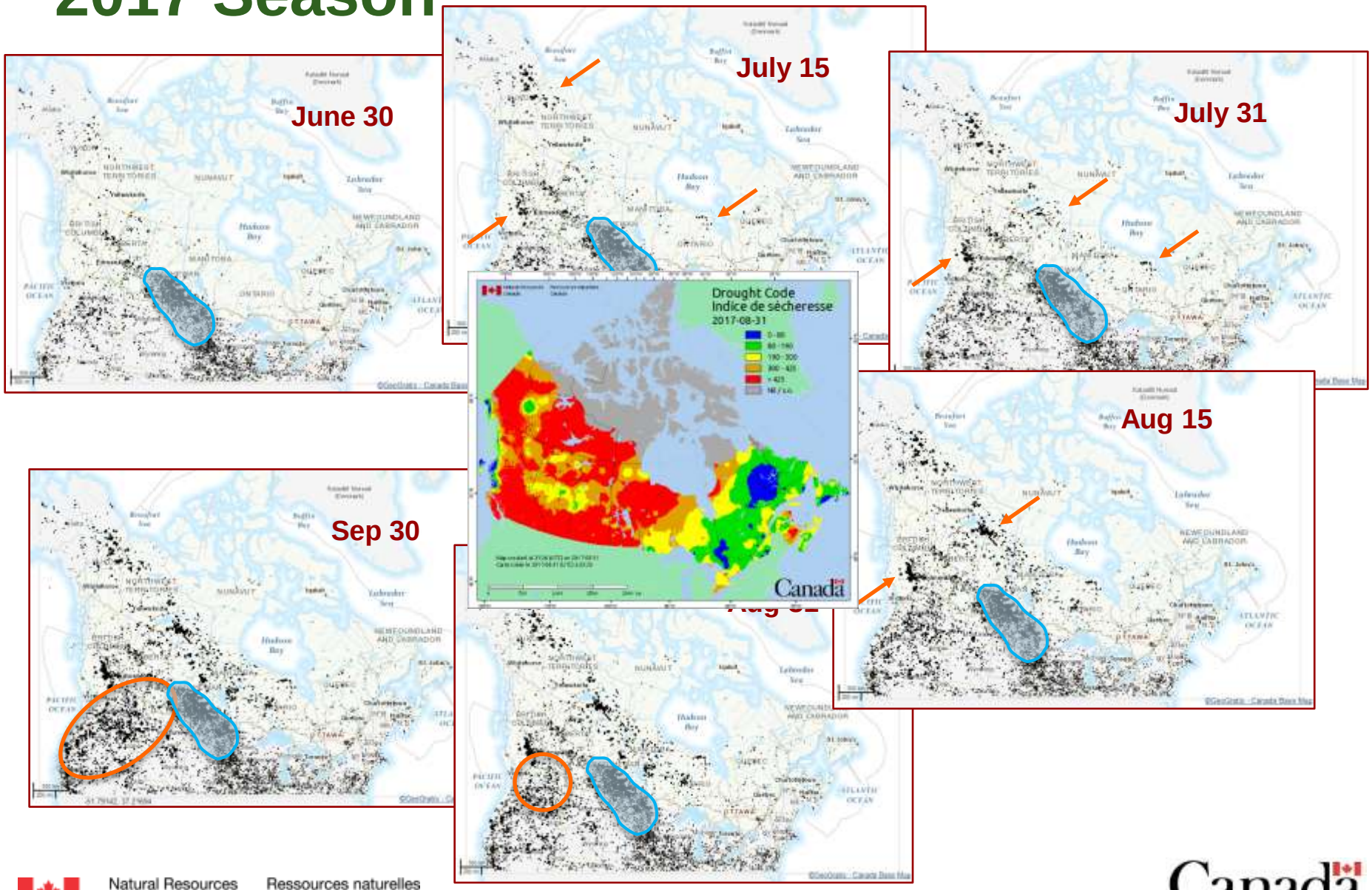
Canada's 2017 Fire Season

Dry southern regions

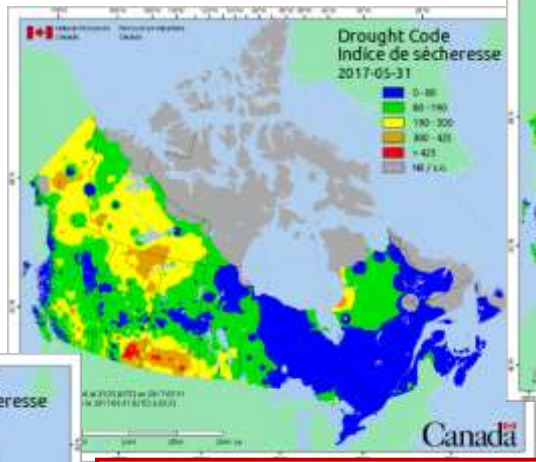
Wildfires burn near Ashcroft, B.C. Credit: Mike Flannigan

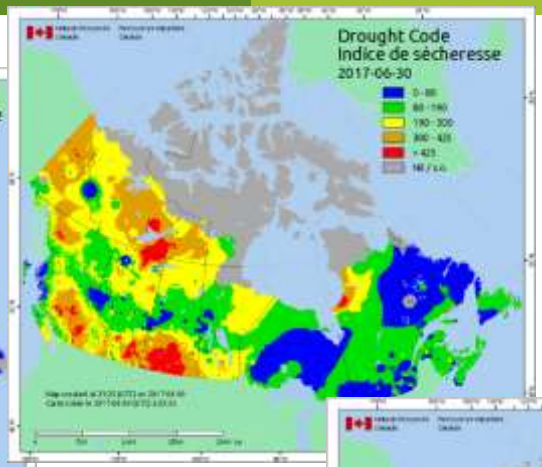
Parts of southern Alberta and Saskatchewan feature similar vegetation

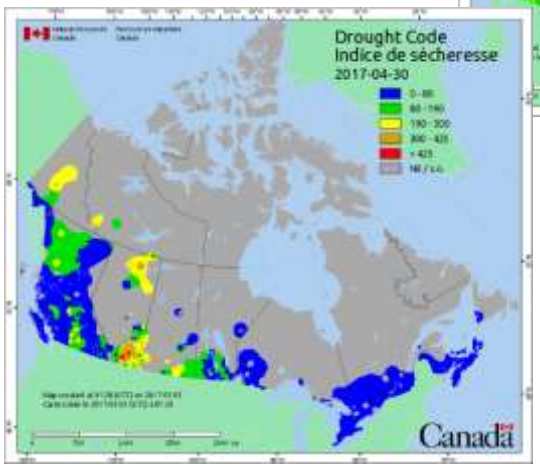
2017 Season

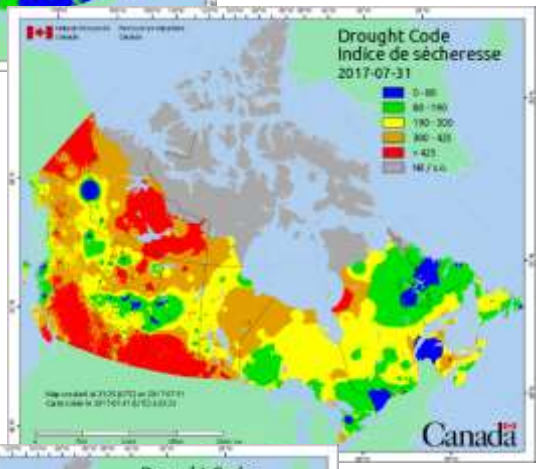

June 30
July 15
July 31
Drought Code
Indice de sècheresse
2017-08-31
Canada
Aug 15
Sep 30

2017 DC

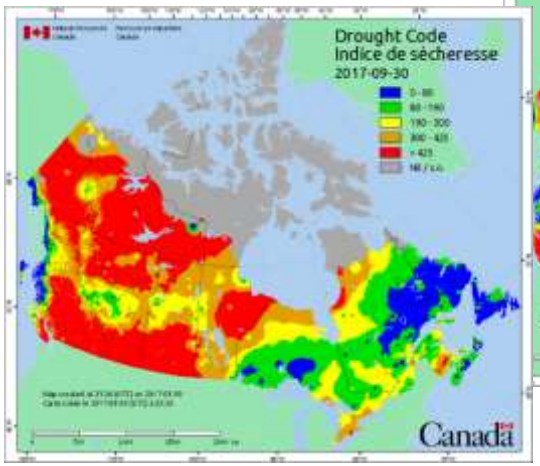


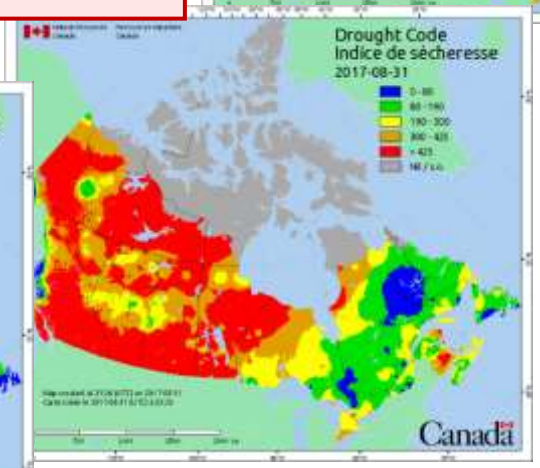




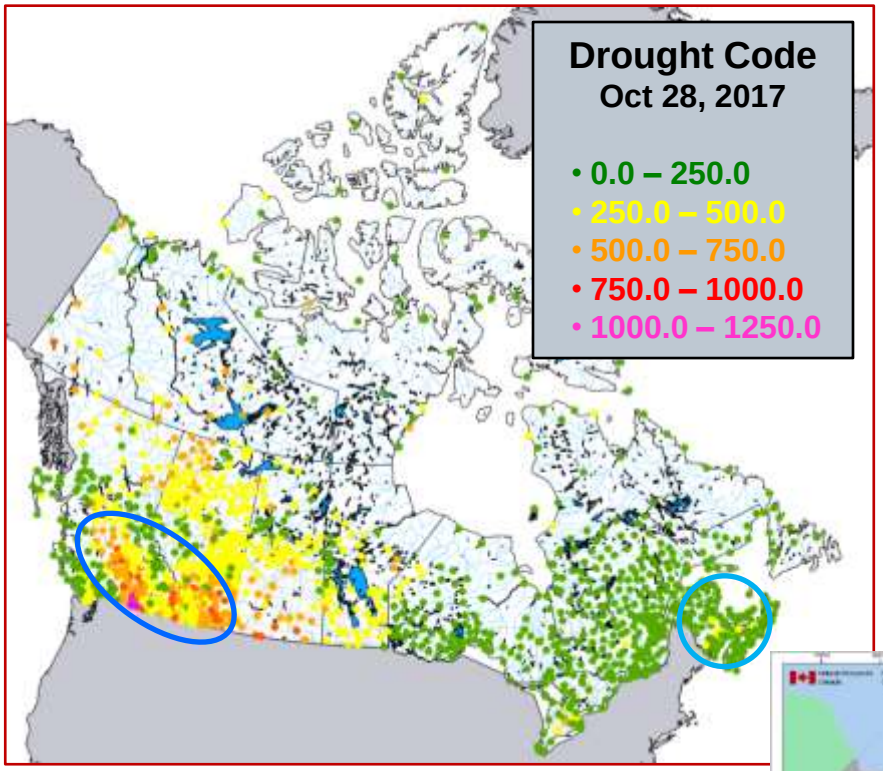


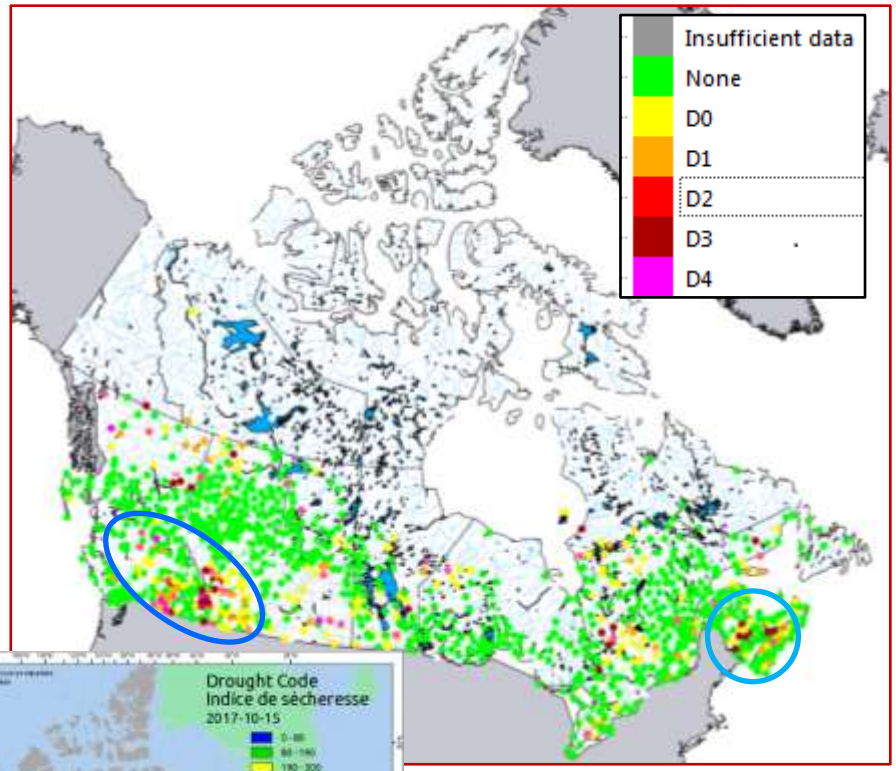
Drought increases fire potential, but triggers (lightning, humans) are needed for ignition

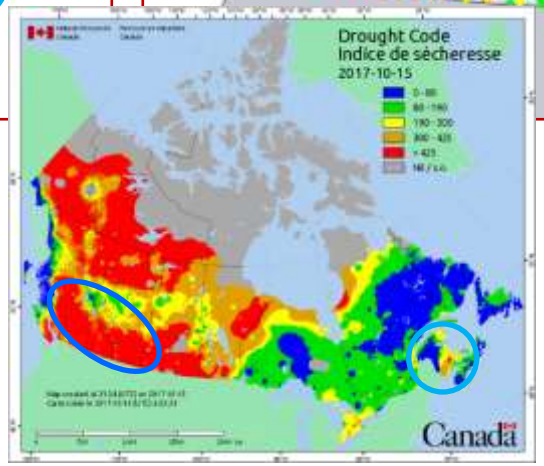




2017 End-of-season Drought Code







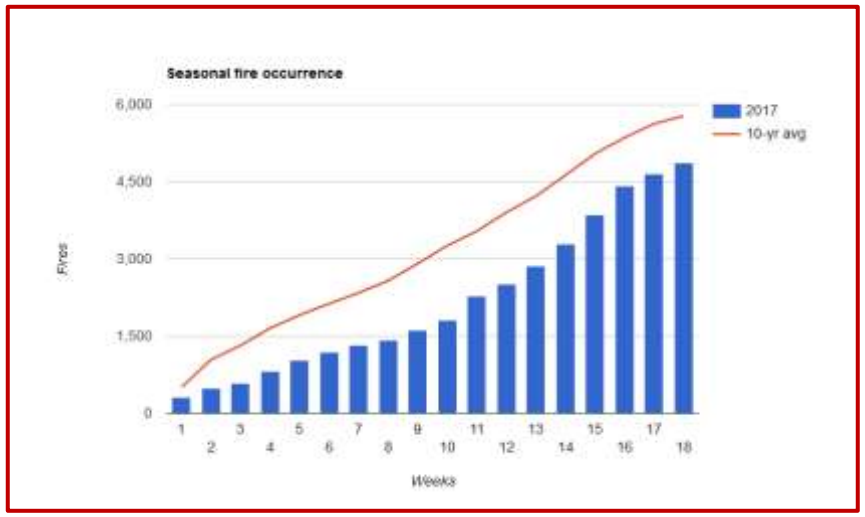
Many locations >=90th percentile for the time of year

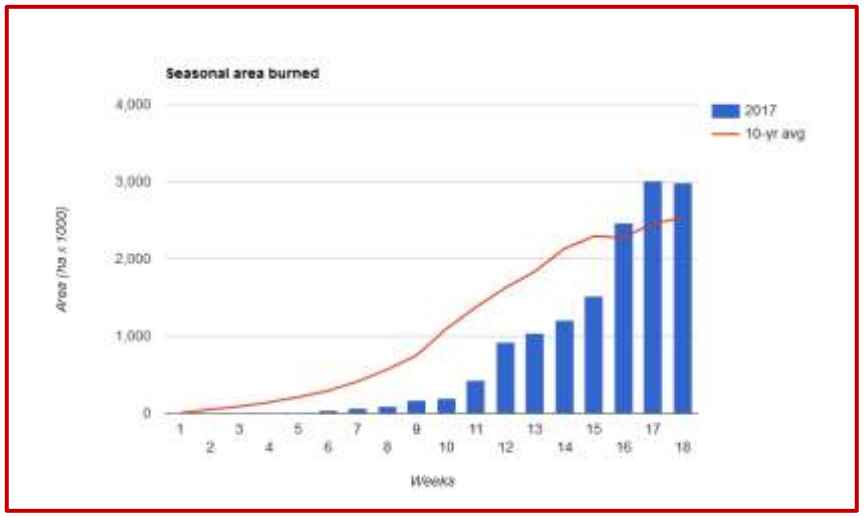
National Fire Statistics

- **CFS/CIFFC situation report August 30 (Sept 21), 2017**

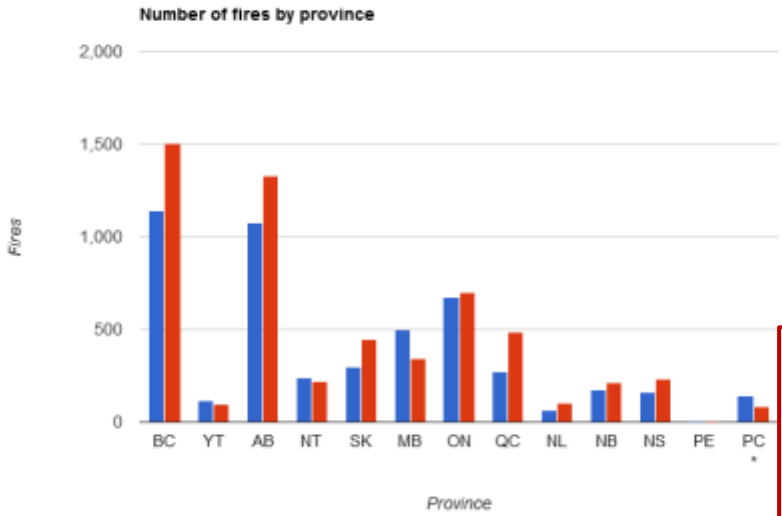
	2017 (to date)	10-yr avg (to date)*	% Normal	Prescribed*	U.S.
Number	4,870 (5,305)	5,780	84	49	52,248
Area (ha)	2,983,460 (3,456,768)	2,527,647	118	6,141	3,571,897

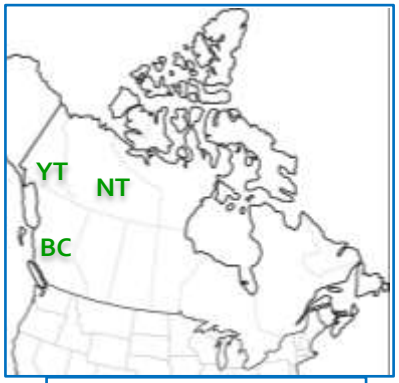
October 12 CWFIS buffered hotspot polygons: 3,632,140 ha



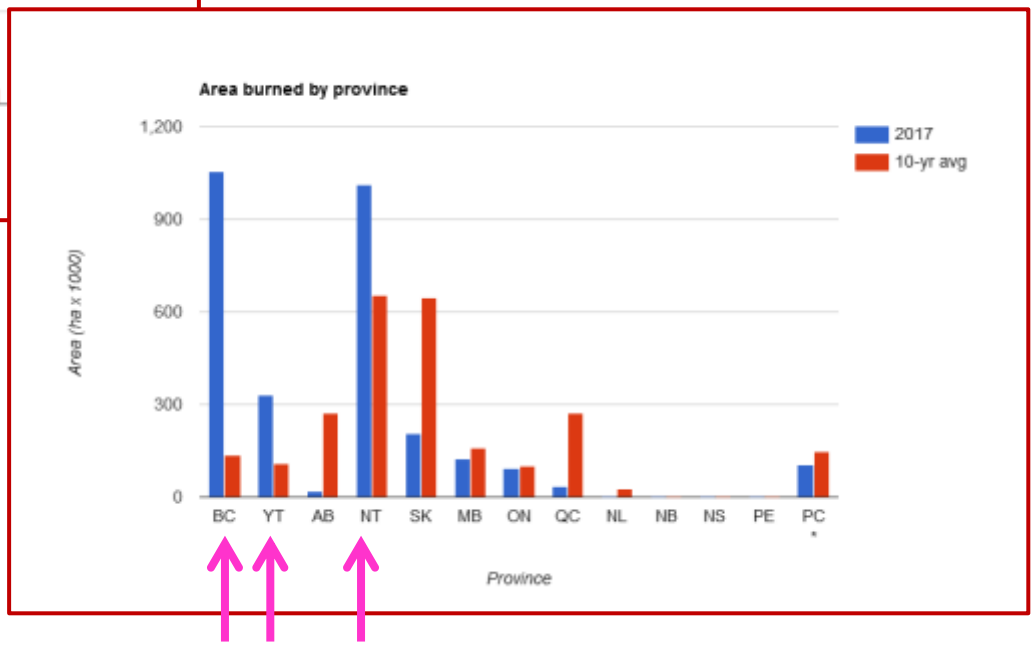


National Fire Statistics





https://www.ndstudies.gov

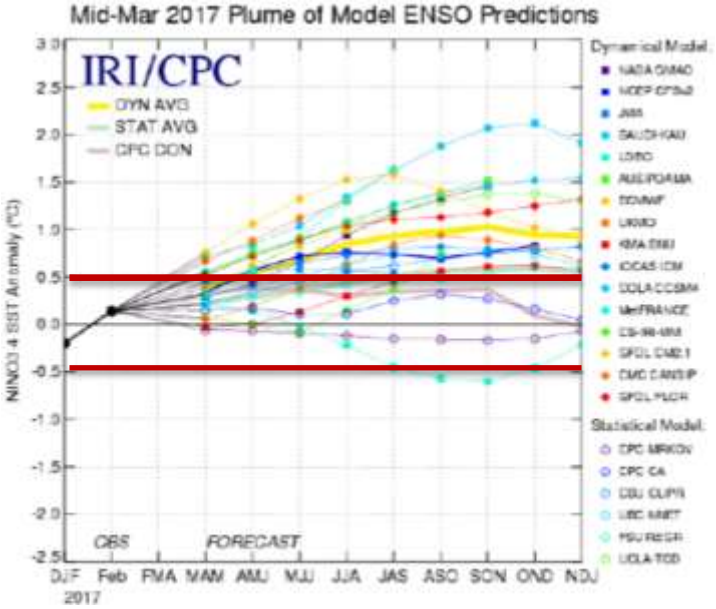


YT, NT, MB, PC had slightly more fires than normal

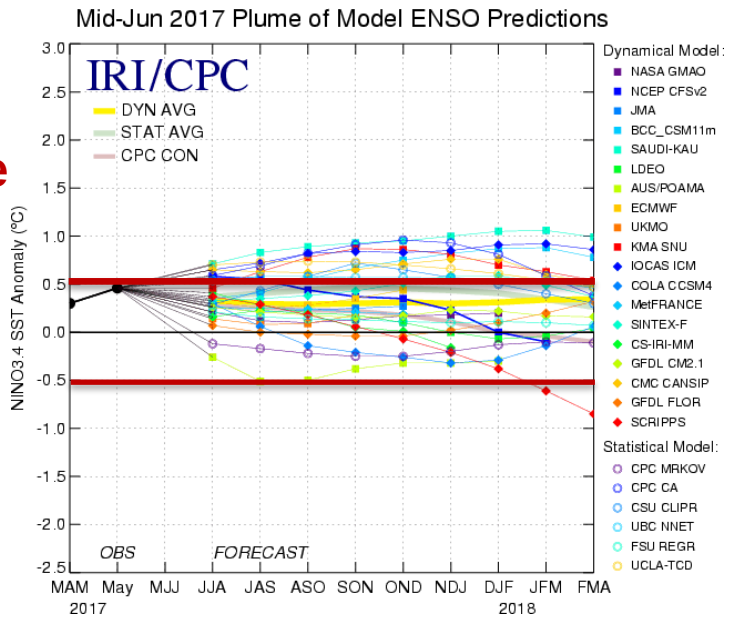
BC, YT, NT had much higher than normal area burned.

2017 Predictions

March

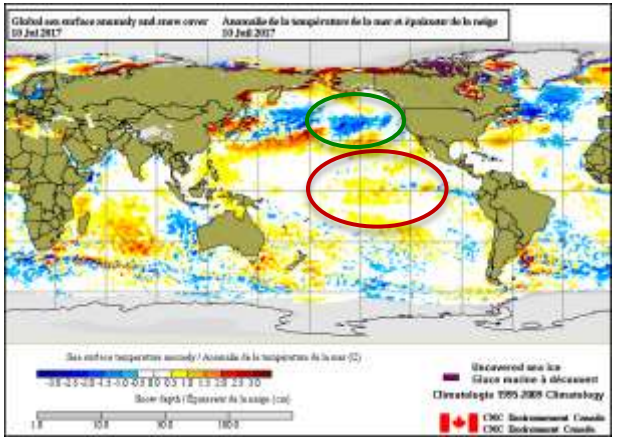


June



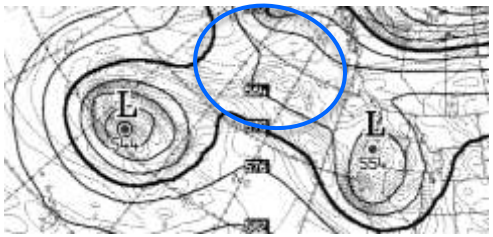
Difficulty predicting trends due to short-lived ENSO events?

Weak "Modoki" ENSO, positive PDO, and MJO may have helped shape the 2017 season.

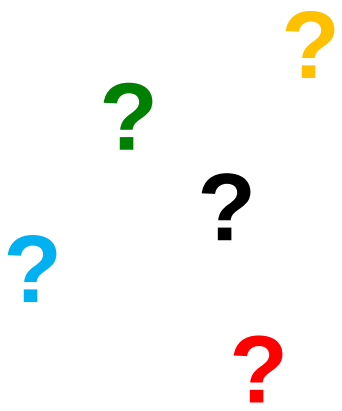


Summary/conclusions

- Summer heat and drying is normal in most of western Canada
  - Dry spring and summer less common
- British Columbia: Rapid late spring drought onset in south
  - Many fires caused by lightning
  - Most area burned and largest fire in recorded data
- Northwest Territories: South Slave area similar, but later?
  - Seeing more saddle points without rain for several weeks?
- Strange events:
  - Large fires on shoulder of James Bay
  - Dry strip in New Brunswick and Nova Scotia



Questions?



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